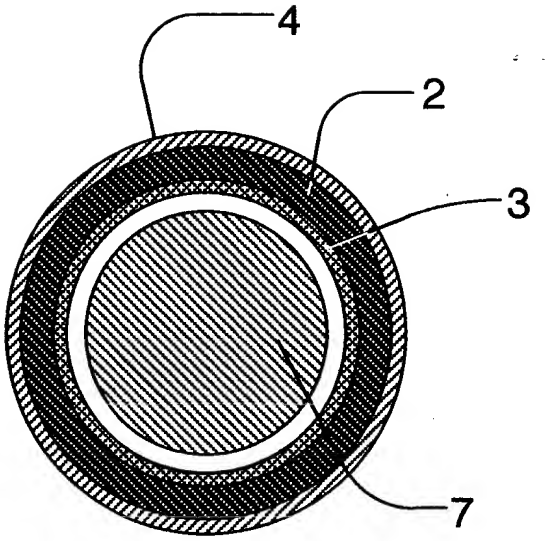
CIP-2 (CIP-1 No: 09/348,142)

OLD DRAWINGS

Figures 1 thru 3



A - A

Fig. 2

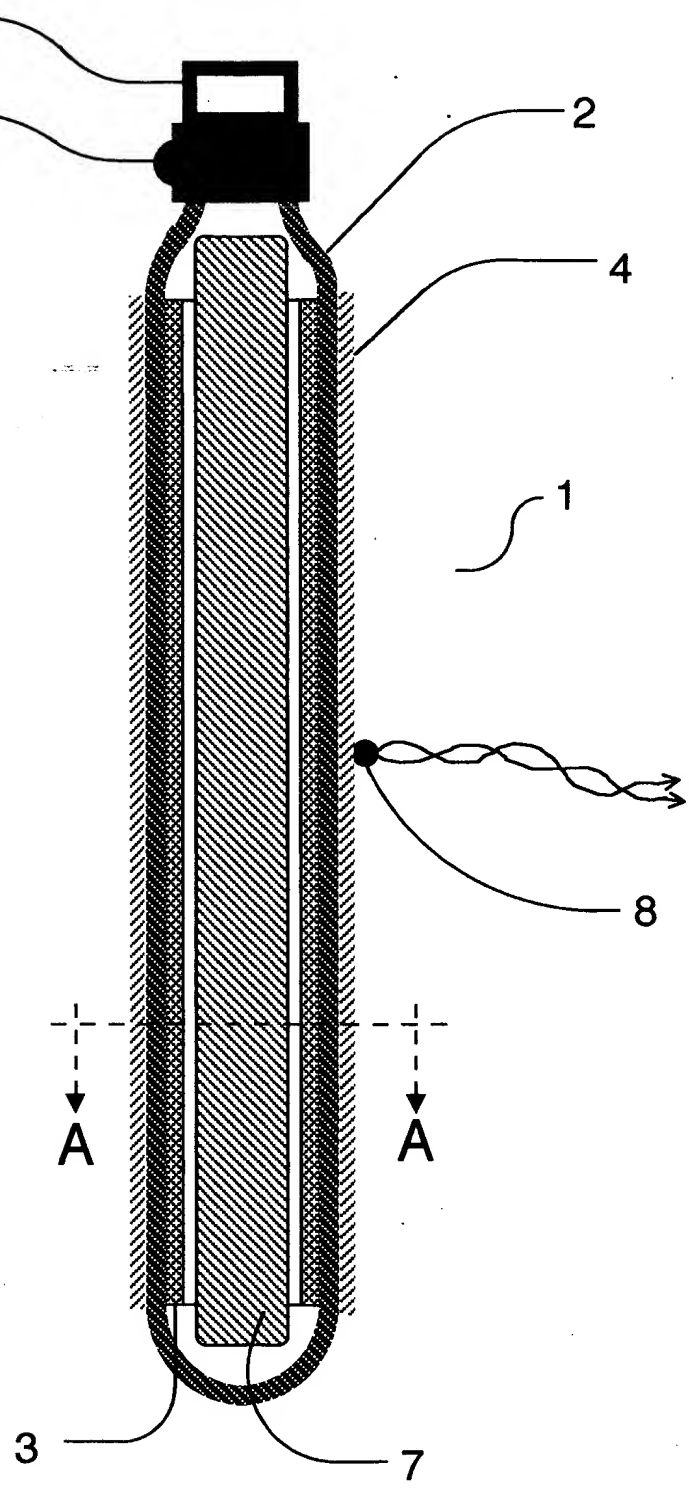
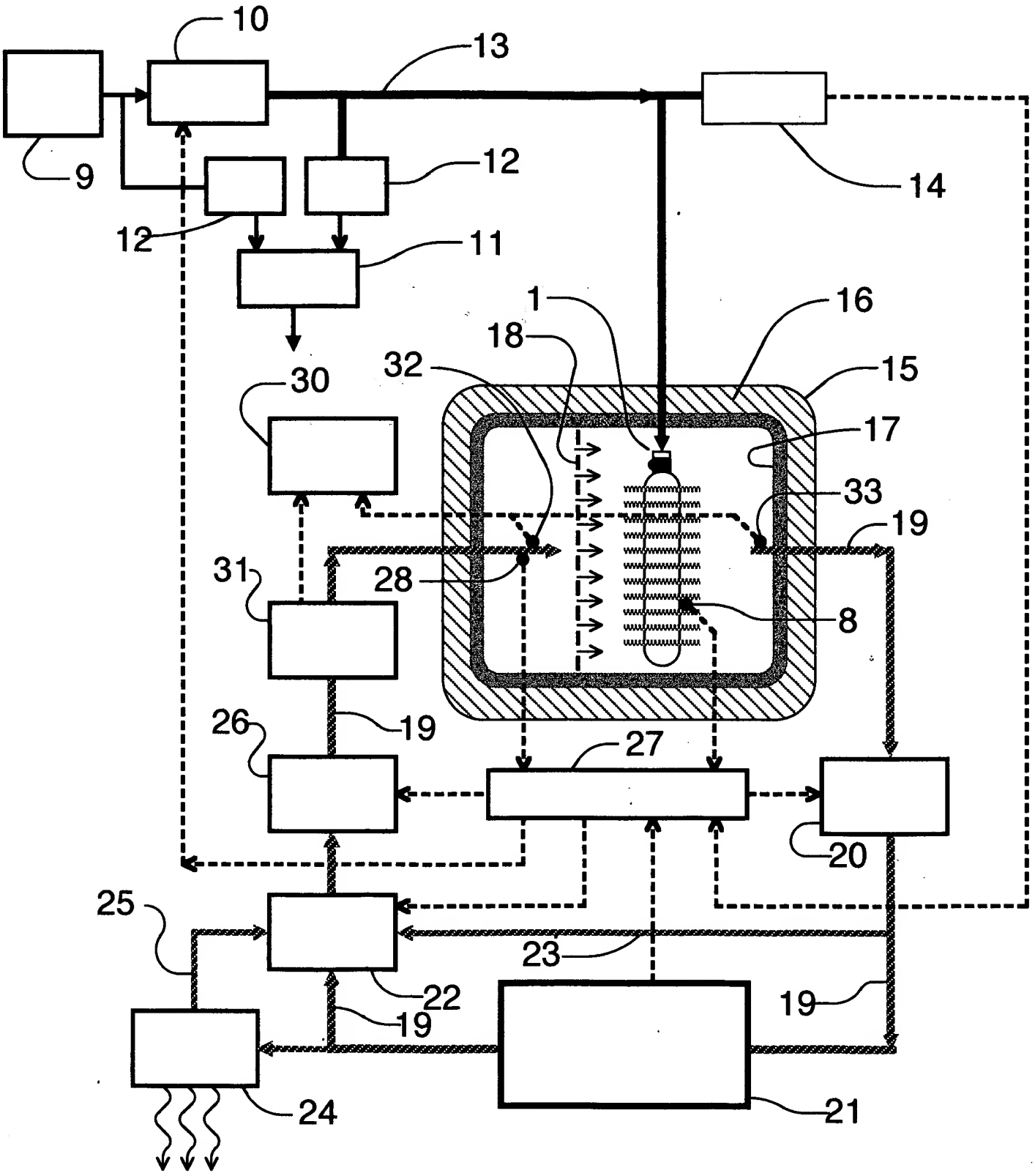


Fig. 1

Fig. 3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CIP-2 (CIP-1 No: 09/348,142)

NEW DRAWINGS

Figures 1 thru 6

Informal version with words

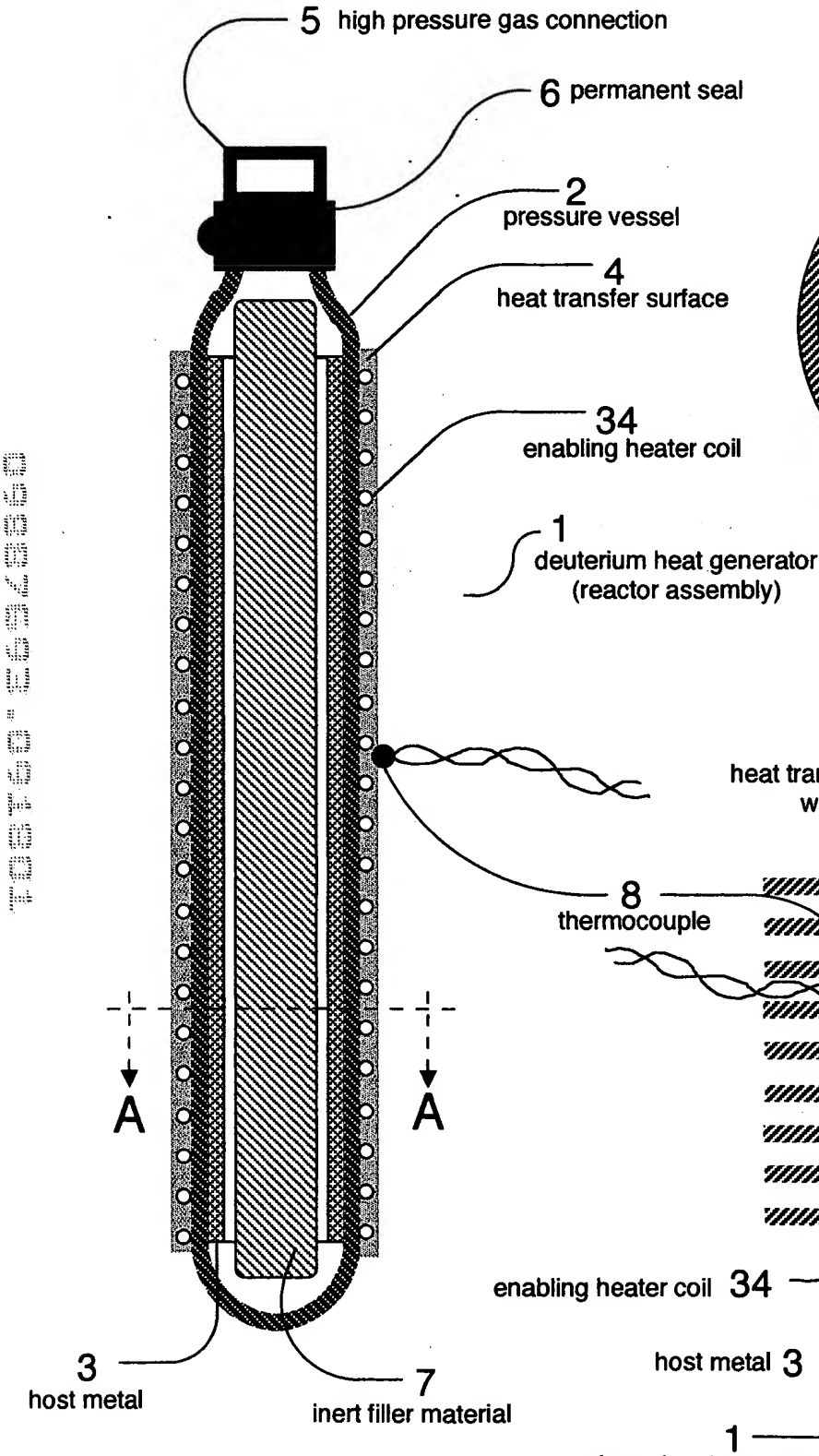

Fig. 1

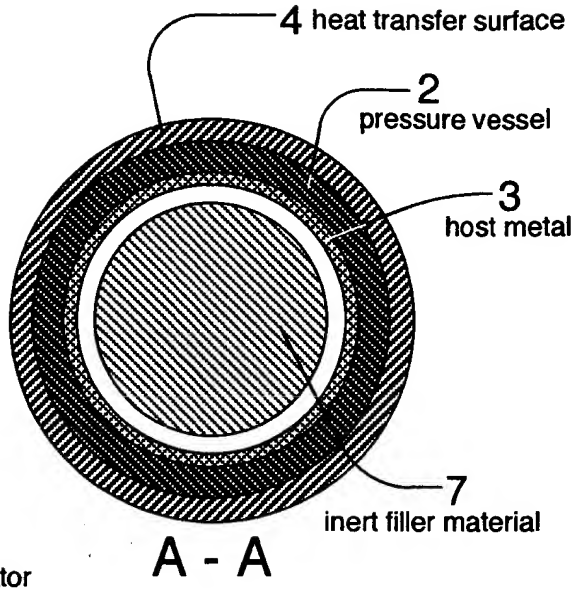

Fig. 3

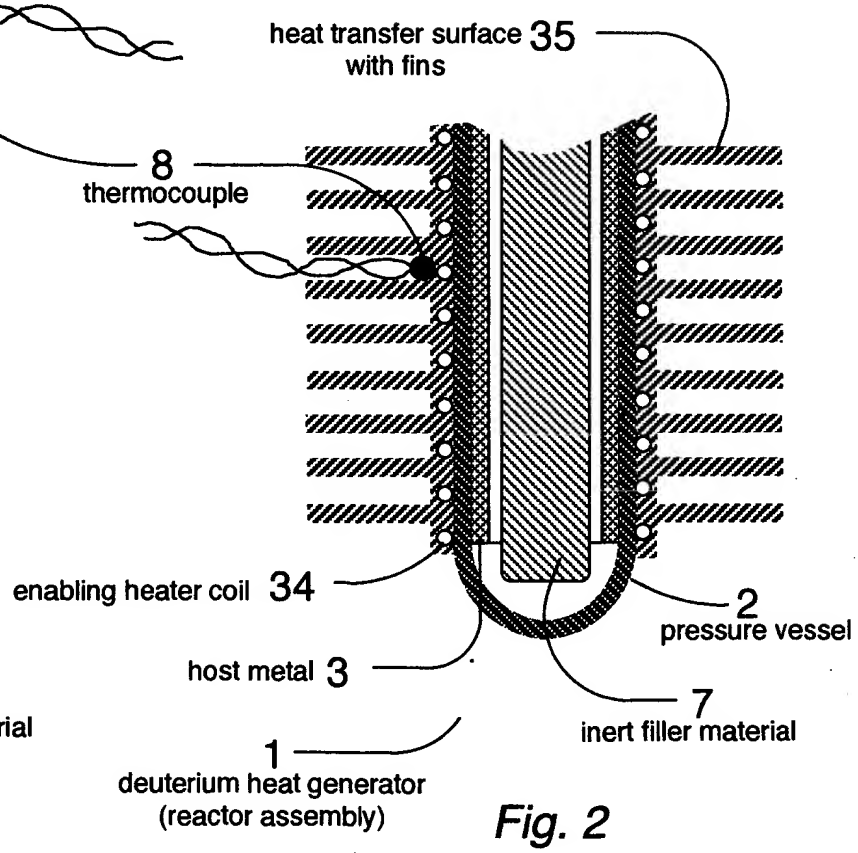

Fig. 2

Typical Alternate Arrangement for the Host Metal & Heat Transfer Surface

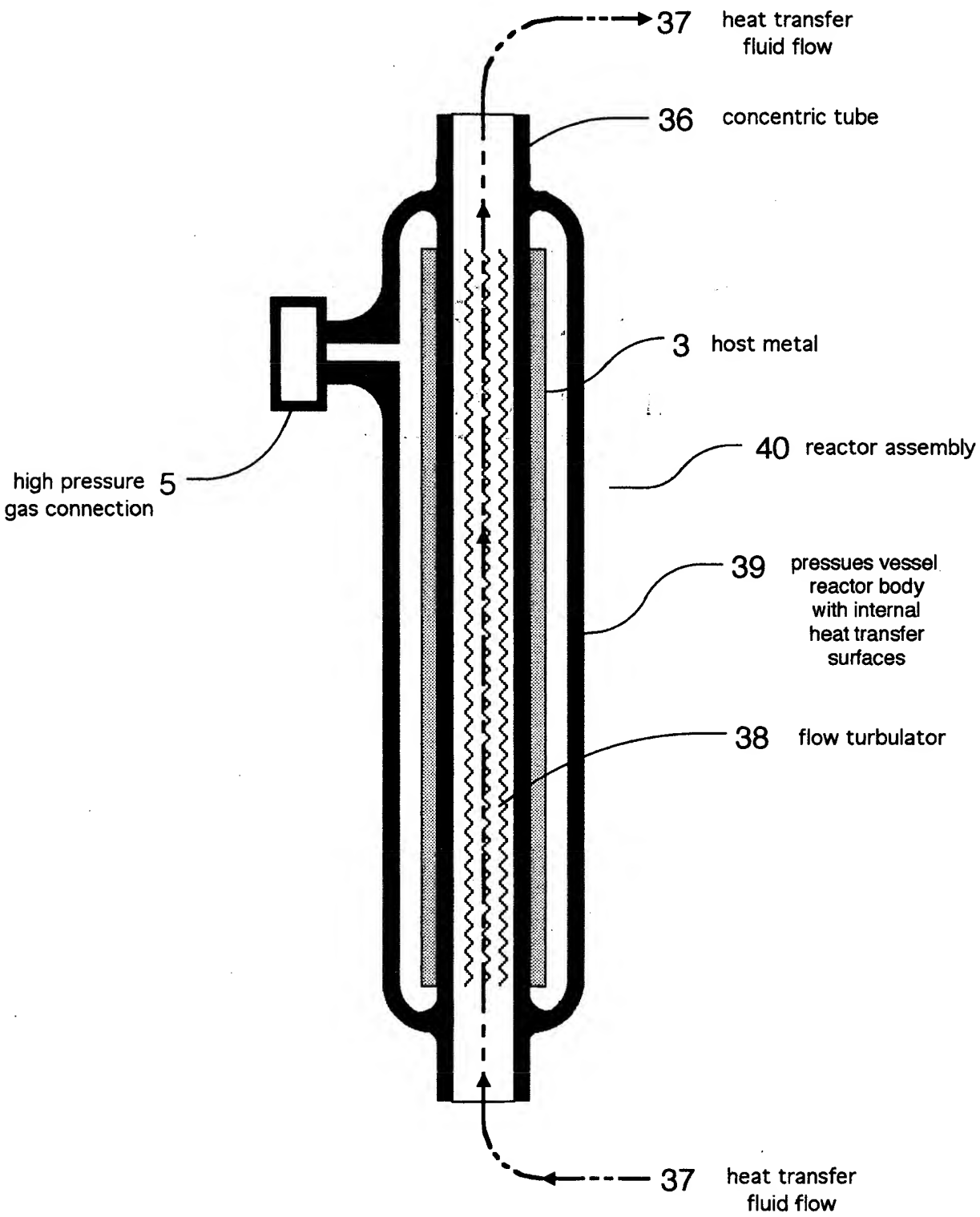

Fig. 4

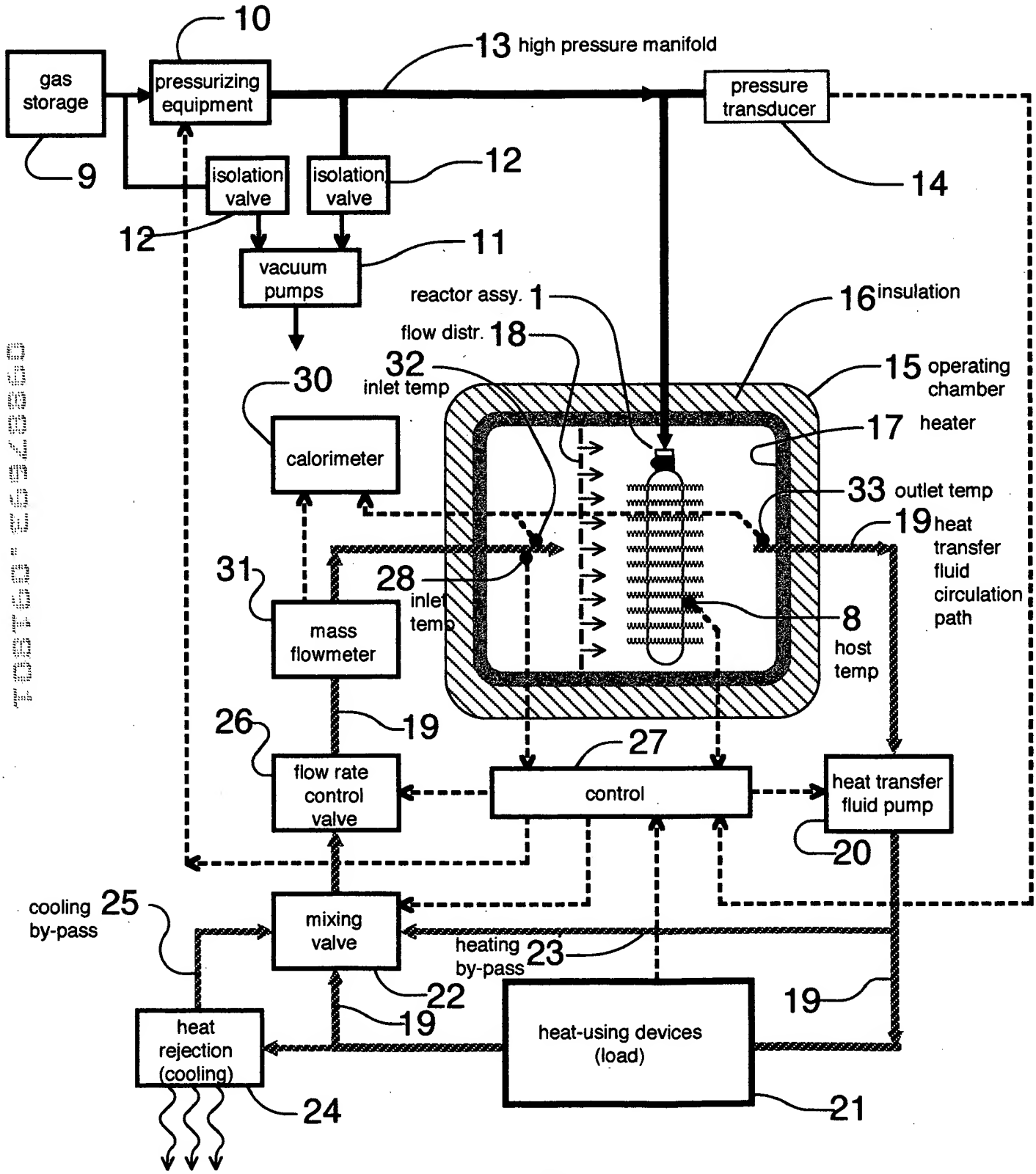

Fig. 5
control system schematic

Typical Scanning Reactor Arrangement

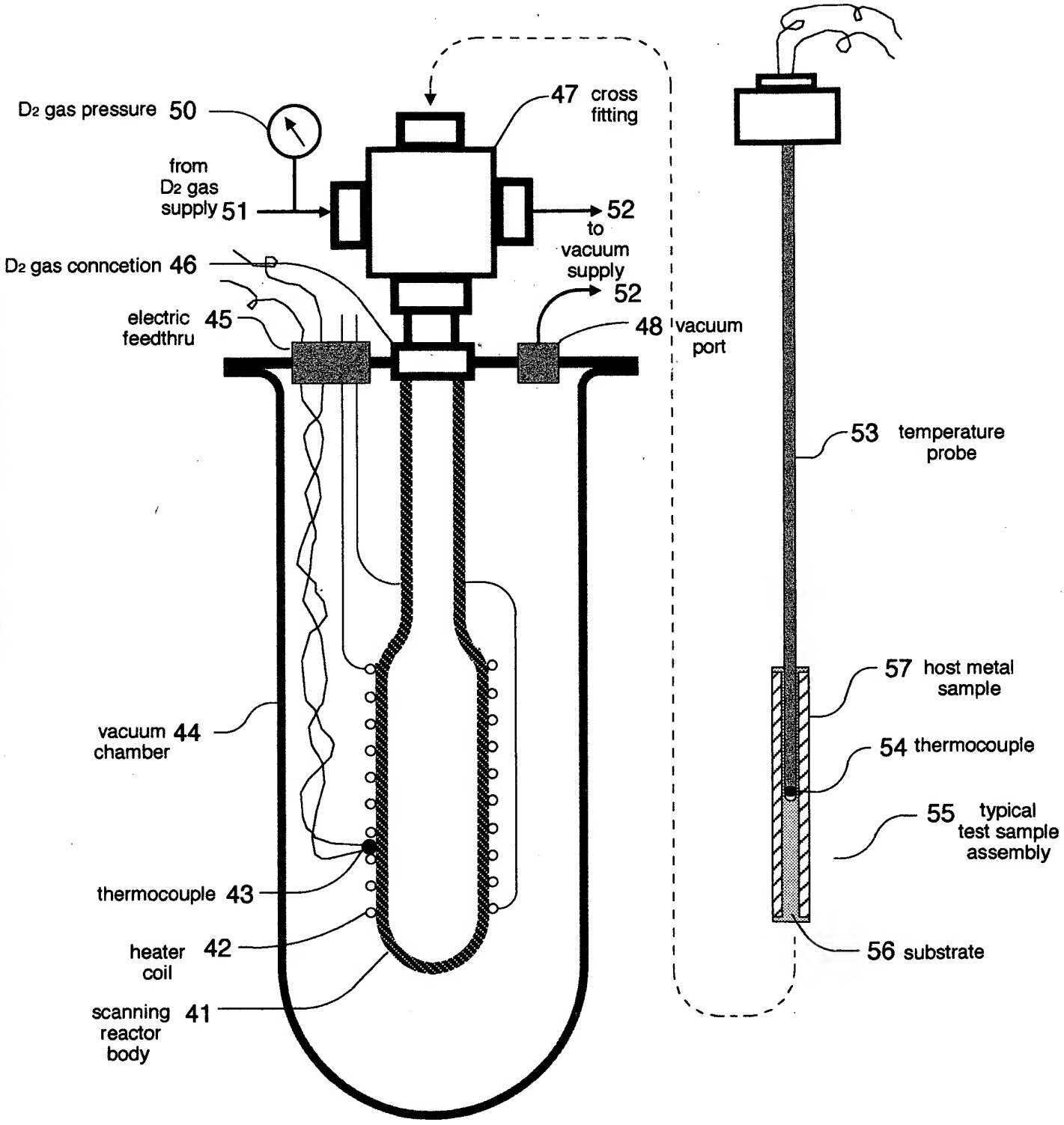

Fig. 6

CIP-2 (CIP-1 No: 09/348,142)

NEW DRAWINGS

Figures 1 thru 3 and 5

Changes Noted

Changes

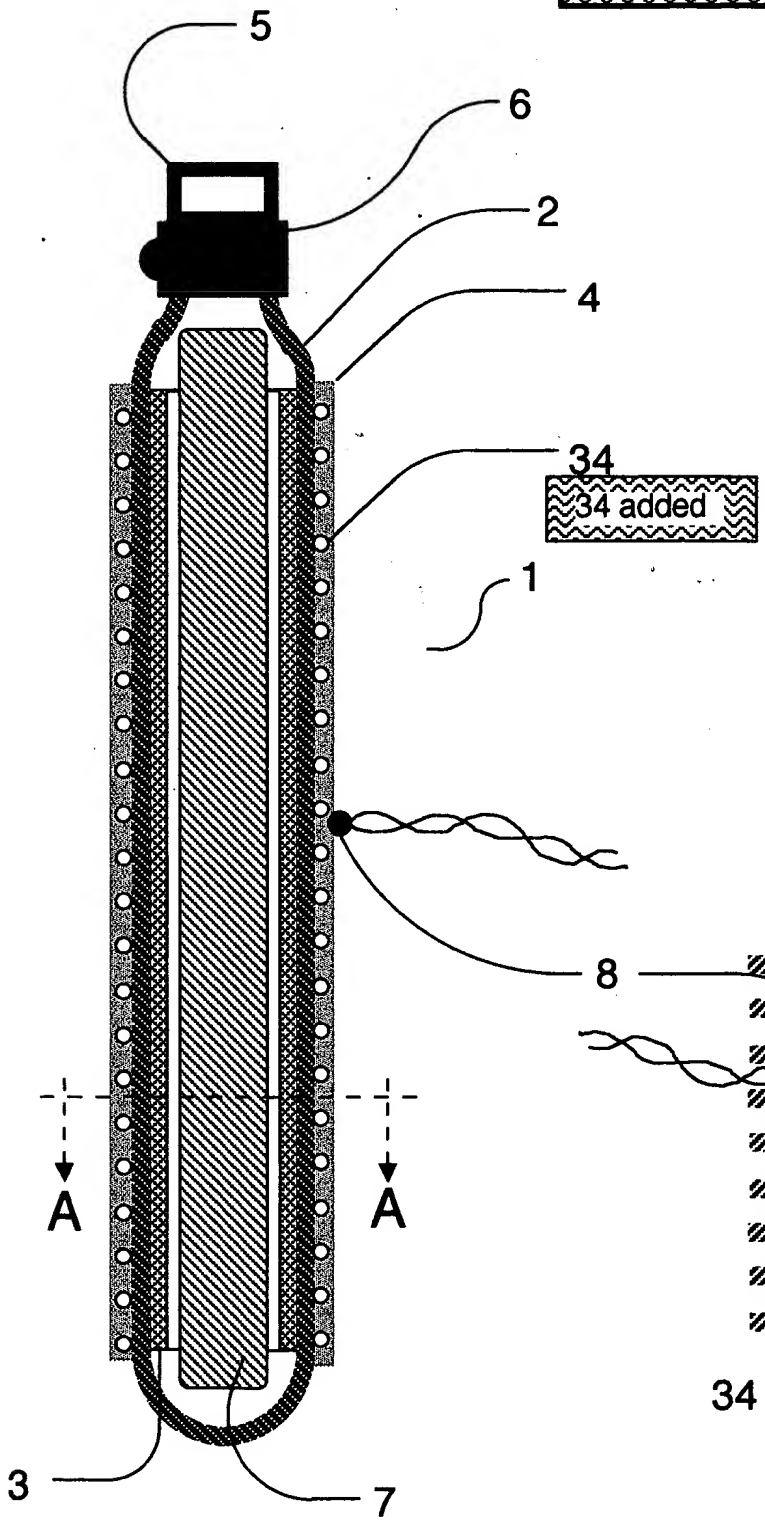

Fig. 1

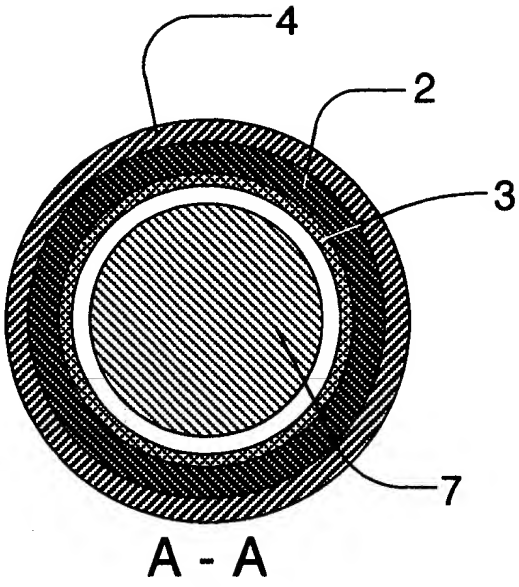

Fig. 3

was Fig. 2

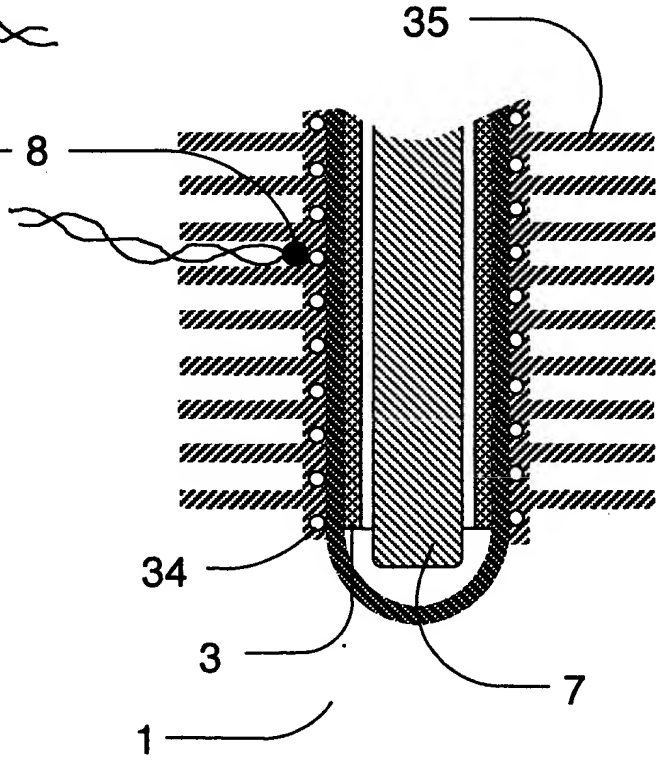

Fig. 2

Fig. 2 added

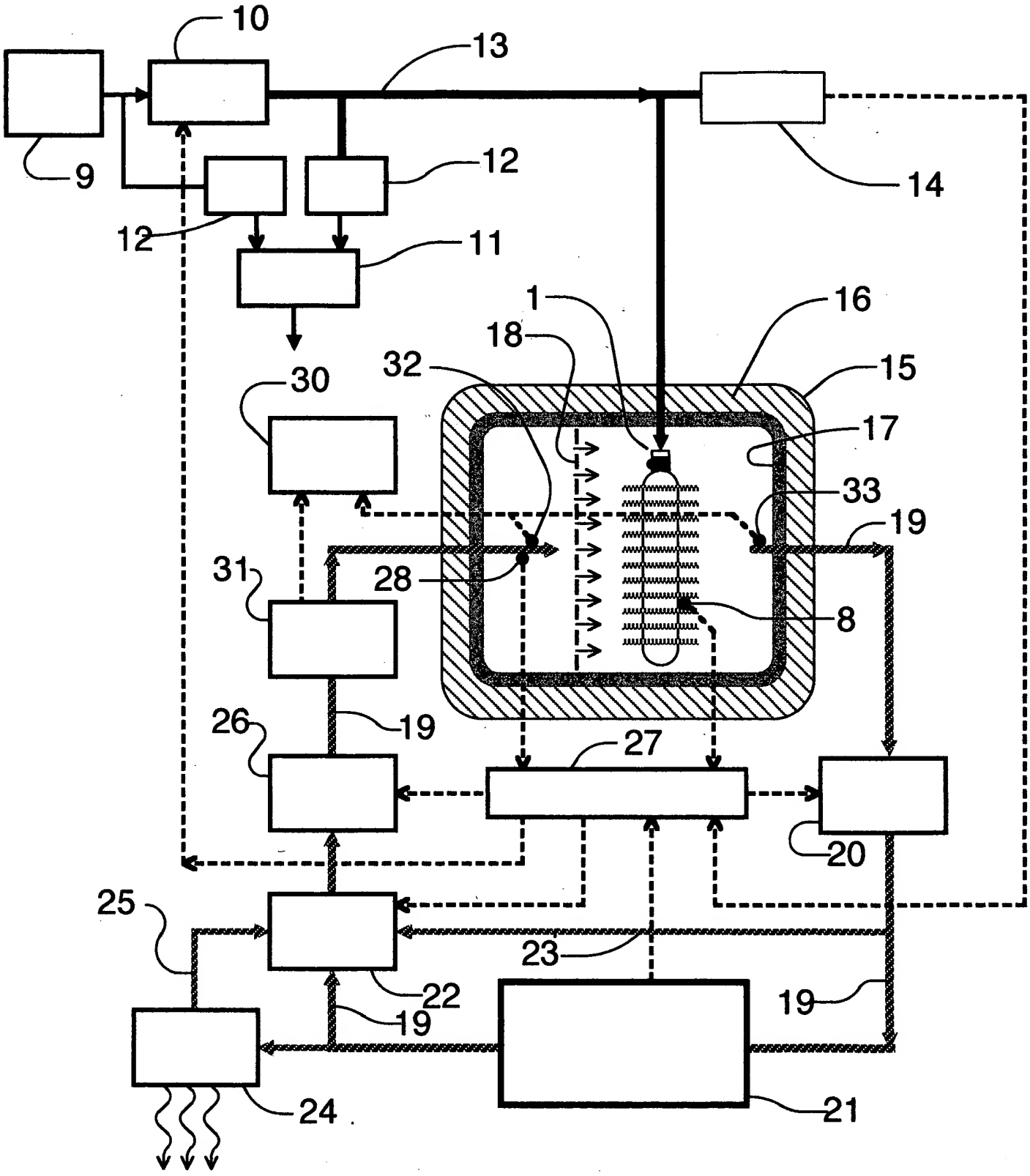

Fig. 5

was Fig. 3

CIP-2 (CIP-1 No: 09/348,142)

NEW DRAWINGS

Figures 1 thru 9

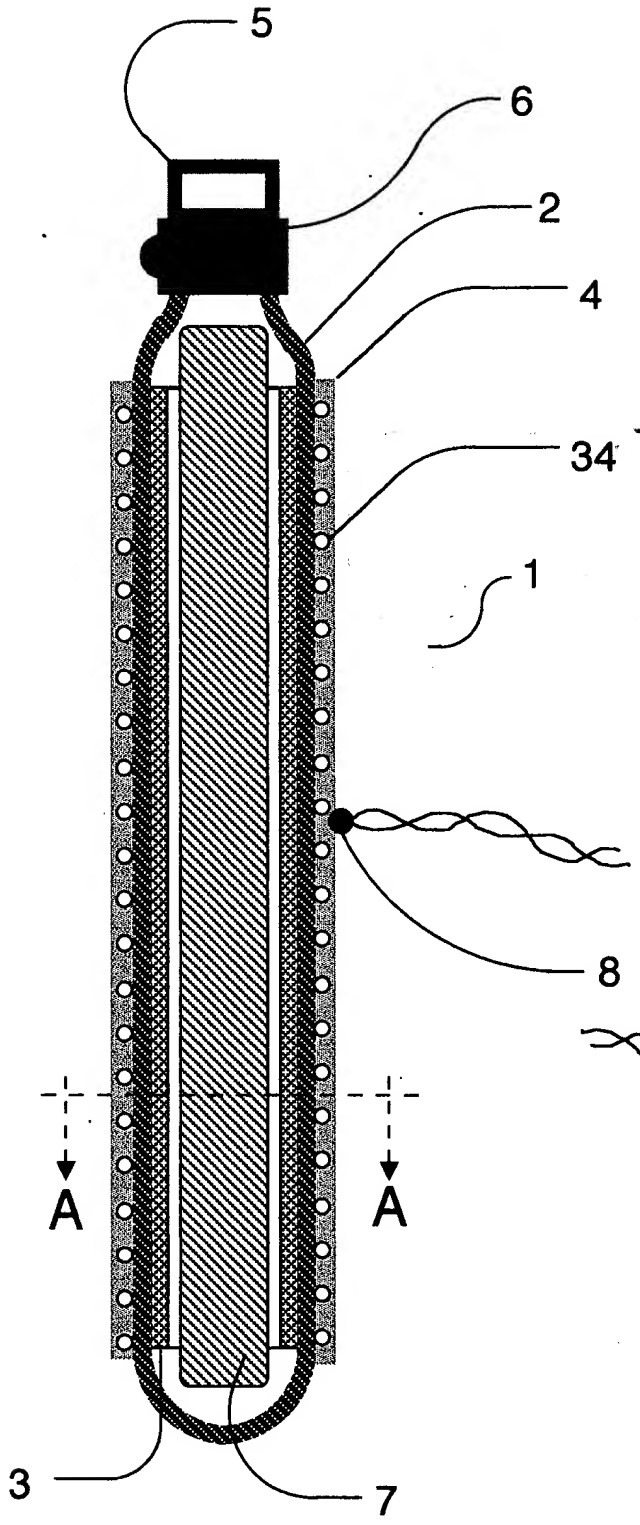

Fig. 1

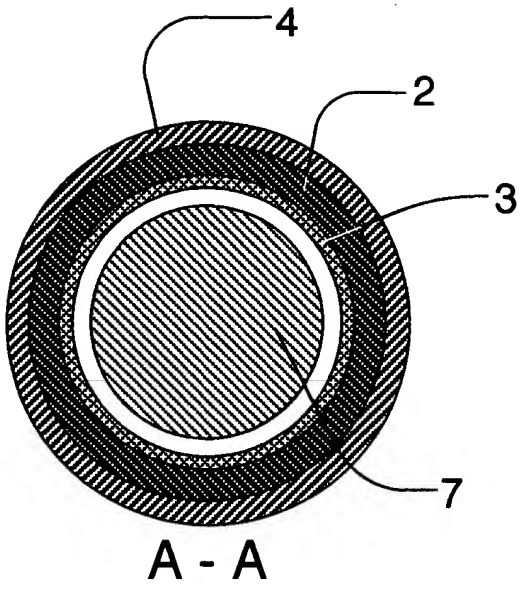

Fig. 3

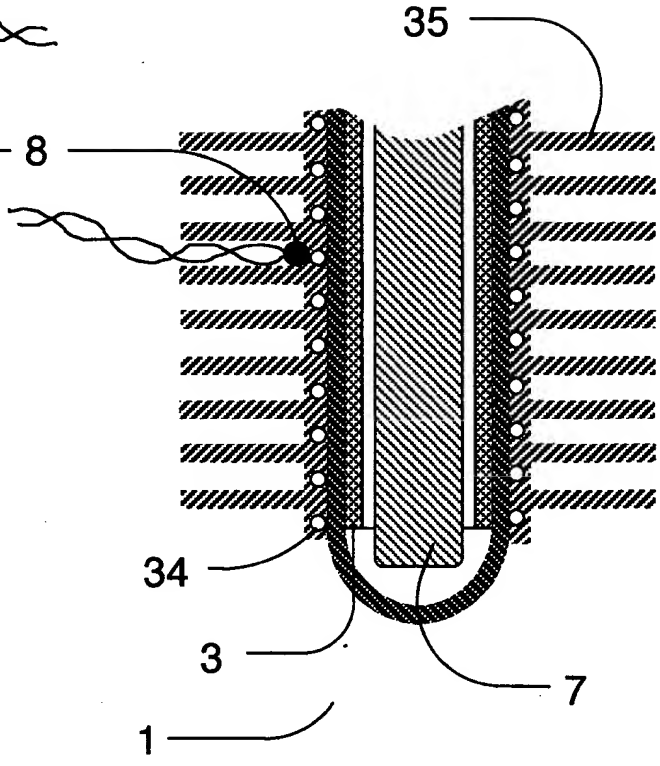

Fig. 2

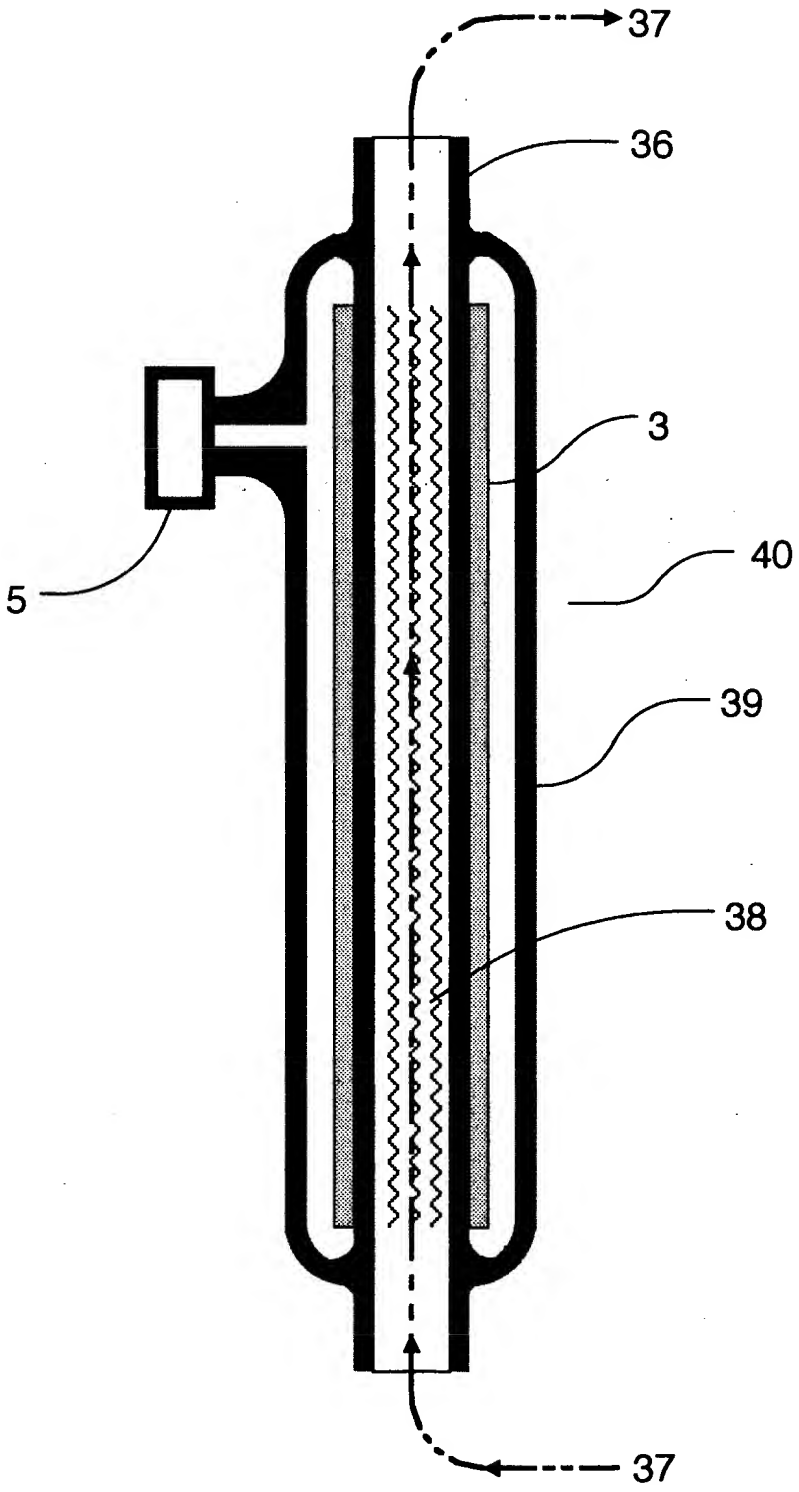

Fig. 4

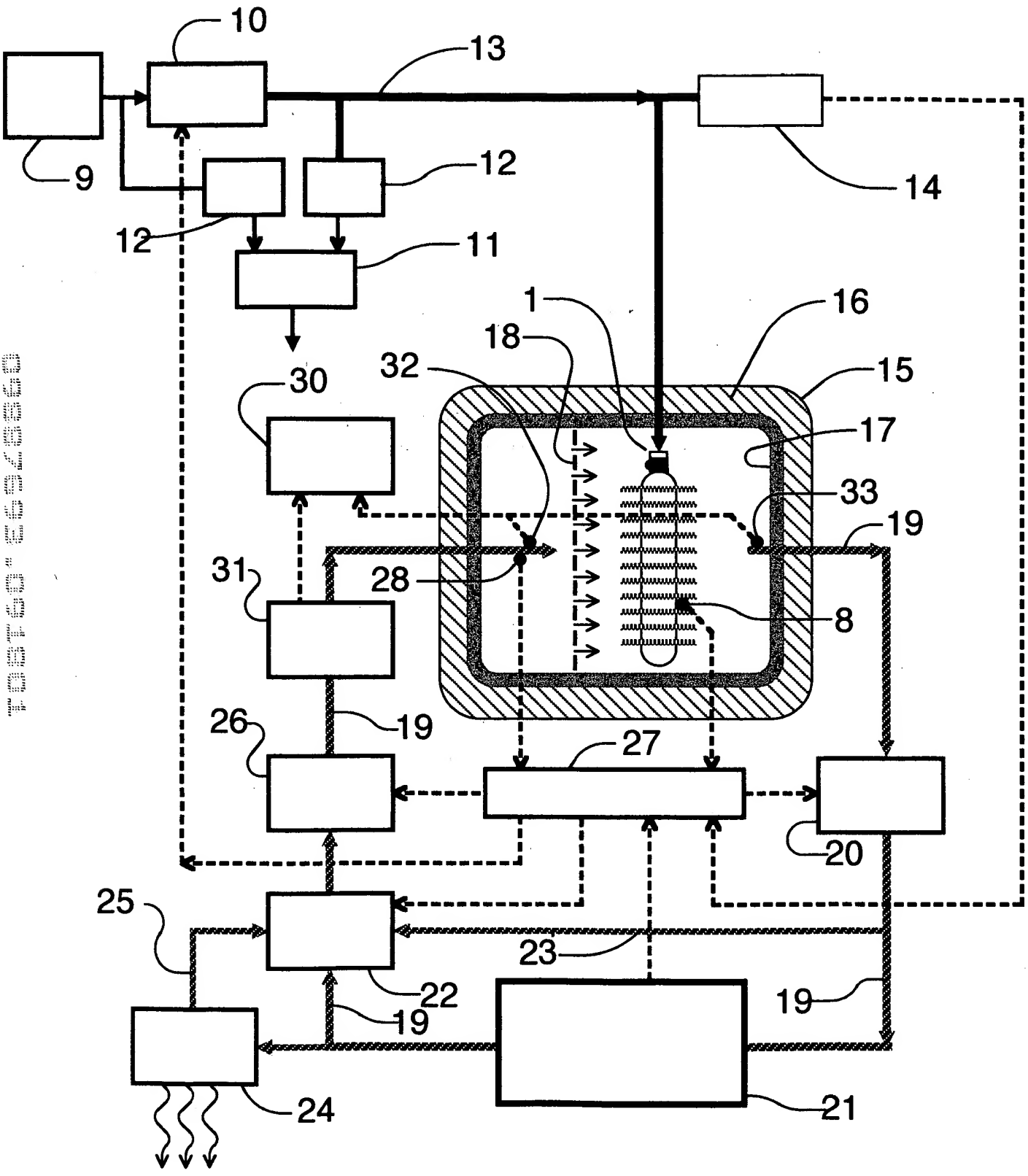
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Fig. 5

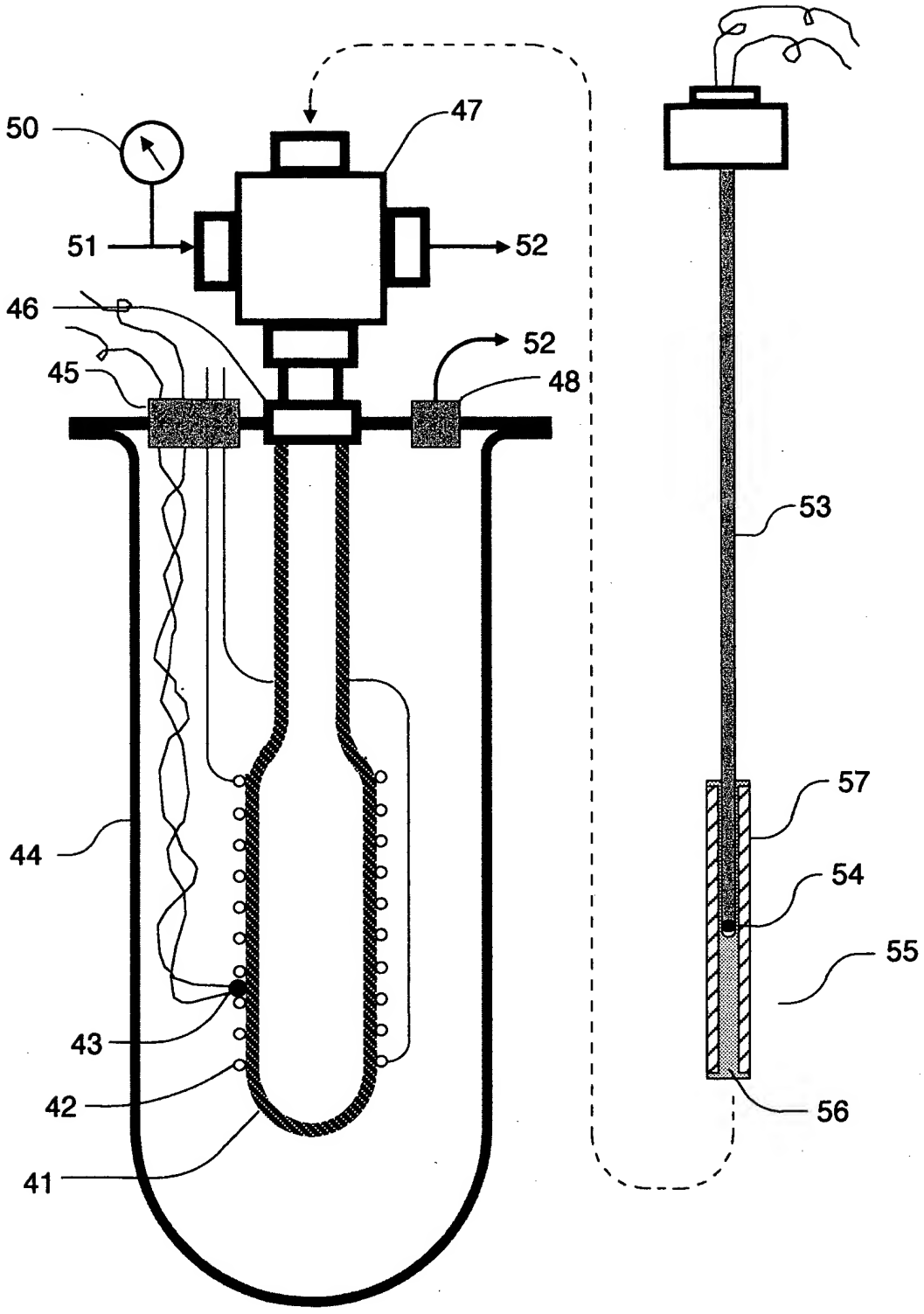

Fig. 6

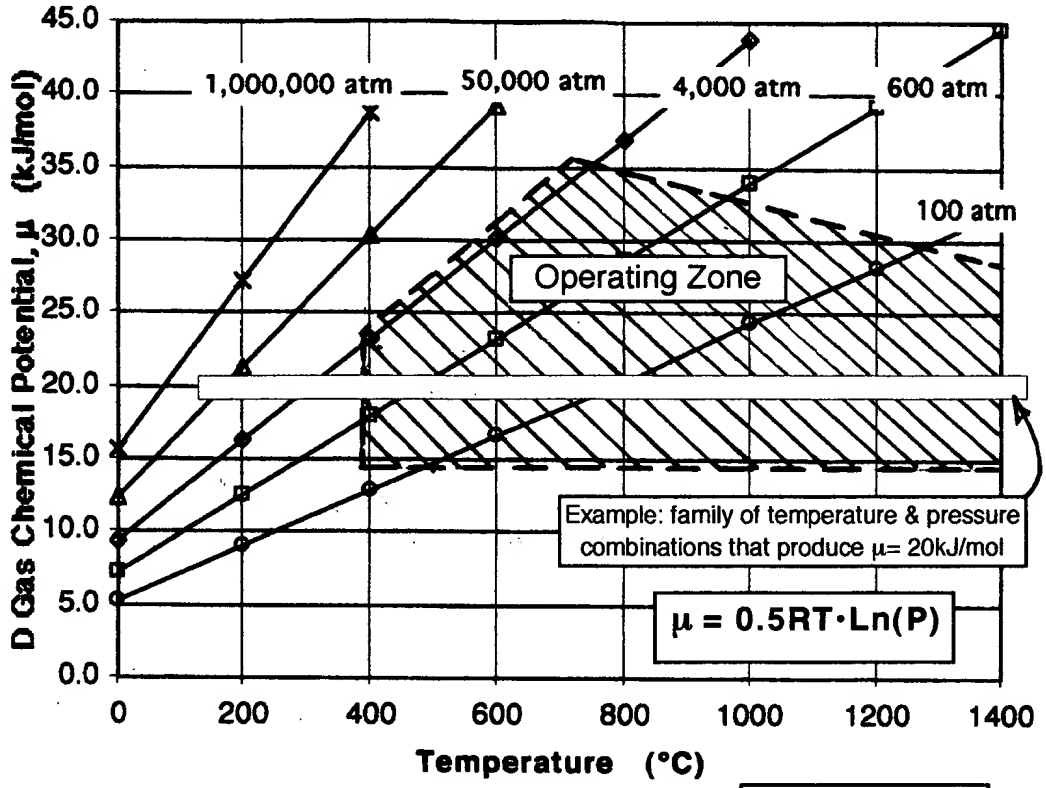

Fig. 7

Notes:

1. For any given system free energy state and corresponding D chemical potential value, there is a family of temperature and pressure combinations that will produce that same value.
2. The above operating temperature range applies when the host metal has a melting point in the 1500°C range.
3. A broader operating zone is available if one is willing and able to:
   a. use higher pressures to operate at lower temperatures.
   b. use thicker reactor body walls to use higher temperatures or higher pressures.
   c. use higher temperature materials, such as tungsten, for the reactor body to achieve D chemical potentials in the 60kJ/mol range and operating temperatures in the 3000°C range.

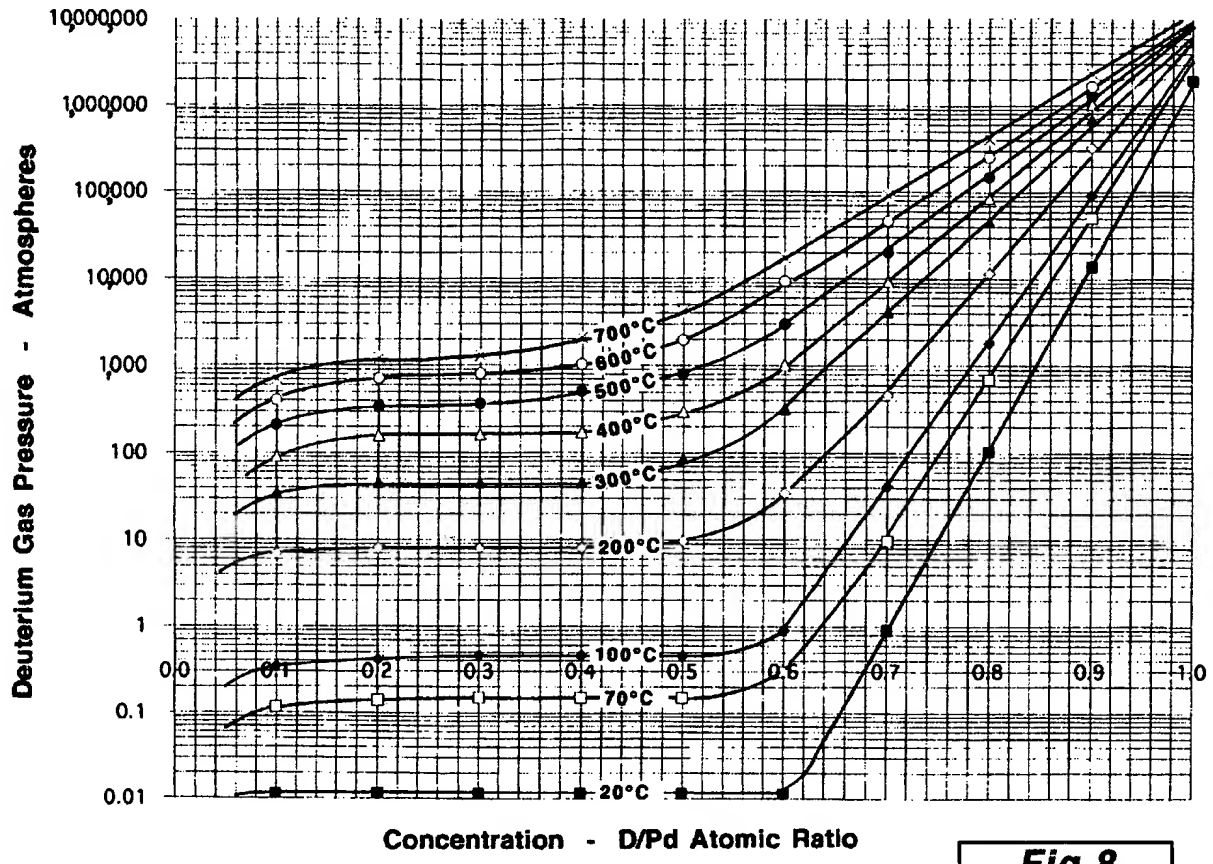

Fig 8

Notes:

1. Any point on this diagram represents the temperature, pressure and concentration when the gas phase and the solid phase are in equilibrium.
2. At equilibrium, the deuterium gas chemical potential is equal to the chemical potential of the dissolved deuterium and the concentration is uniform throughout the solid.

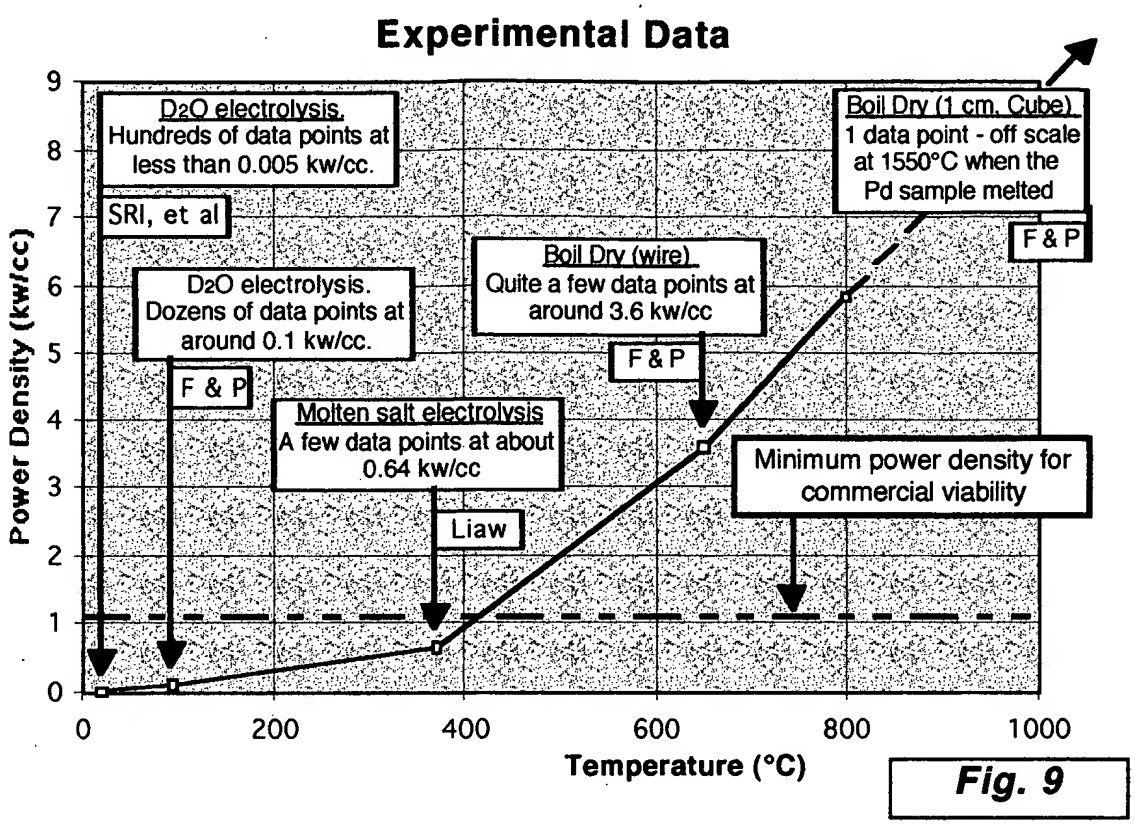

Fig. 9

"Boil Dry" Experiments

• High density heat is produced at high temperatures and at very high free energy states when the electrolytic process is stopped.

• A 'boil dry' experiment starts with a standard Pd-D_2O electrolytic cell which is producing excess heat and the electrolyte is allowed to boil off. Once the electrolyte is gone and the electrolysis stops, the cathode is operating like a 'gas loaded' reactor but without control of the temperature, gas pressure or the heat transfer rate. Without the liquid, the heat transfer coefficient decreases remarkably and it is no longer possible for all of the generated heat to be transferred out of the Pd. The result is the Pd cathode experiences positive temperature feedback creating an out-of-control condition.

• To make the instability worse, the higher temperatures cause an increase in the rate of the fusion reaction. It is the outward diffusion of the ionic deuterium and depletion of the reacting deuterium that eventually brings the episode to an end.

• **The present invention provides the means and the methods to duplicate the free energy states present when the above experiments produced high density heat but provides stable operation.**